

Inventors: VIVEK AGARWAL, VICTOR SUNDARSINGH, SERGE BONTEMPS, ALAIN CALMELS

For: POWER CONVERTER METHOD AND APPARATUS HAVING HIGH INPUT POWER FACTOR AND LOW HARMONIC DISTORTION

Attorney Docket No. 1138-102

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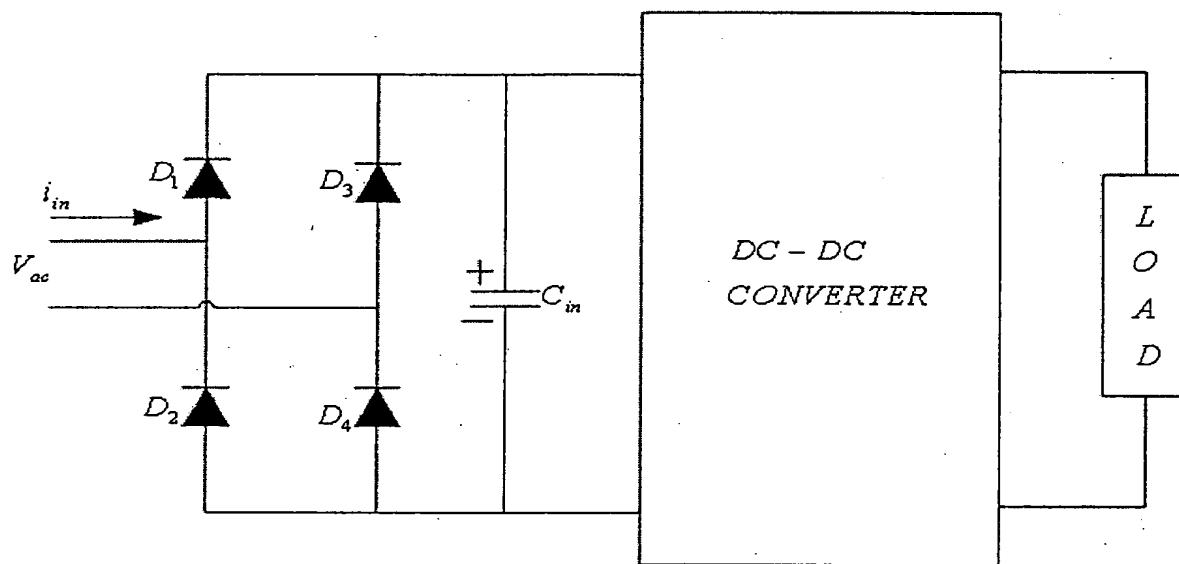


FIG. 1A (PRIOR ART)

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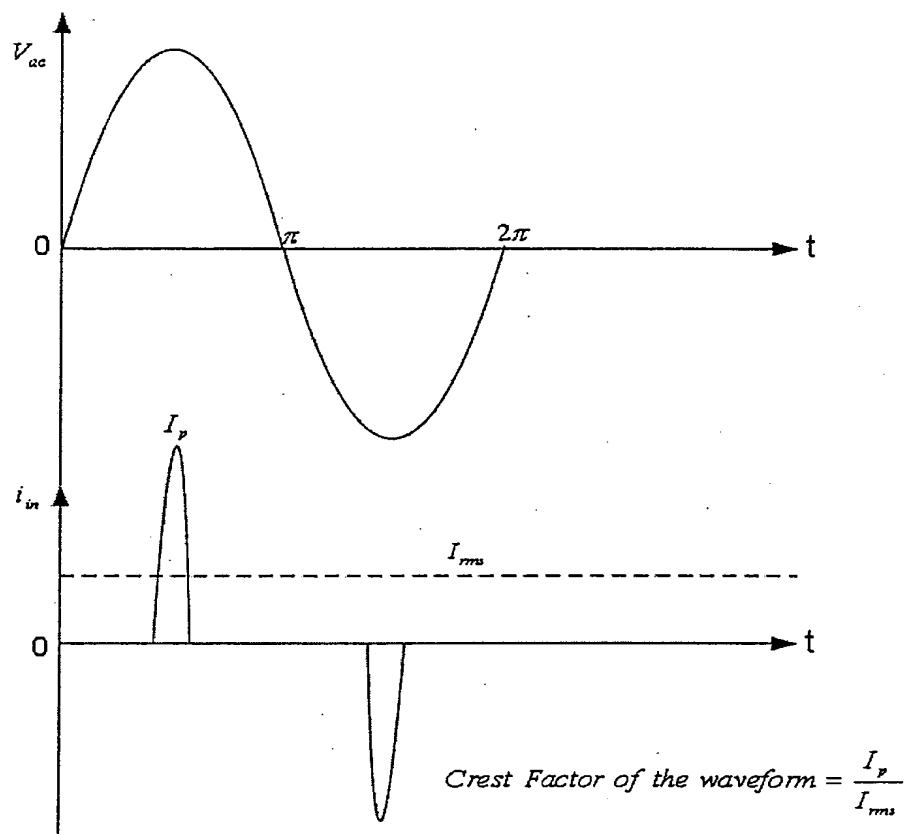


FIG. 1B (PRIOR ART)

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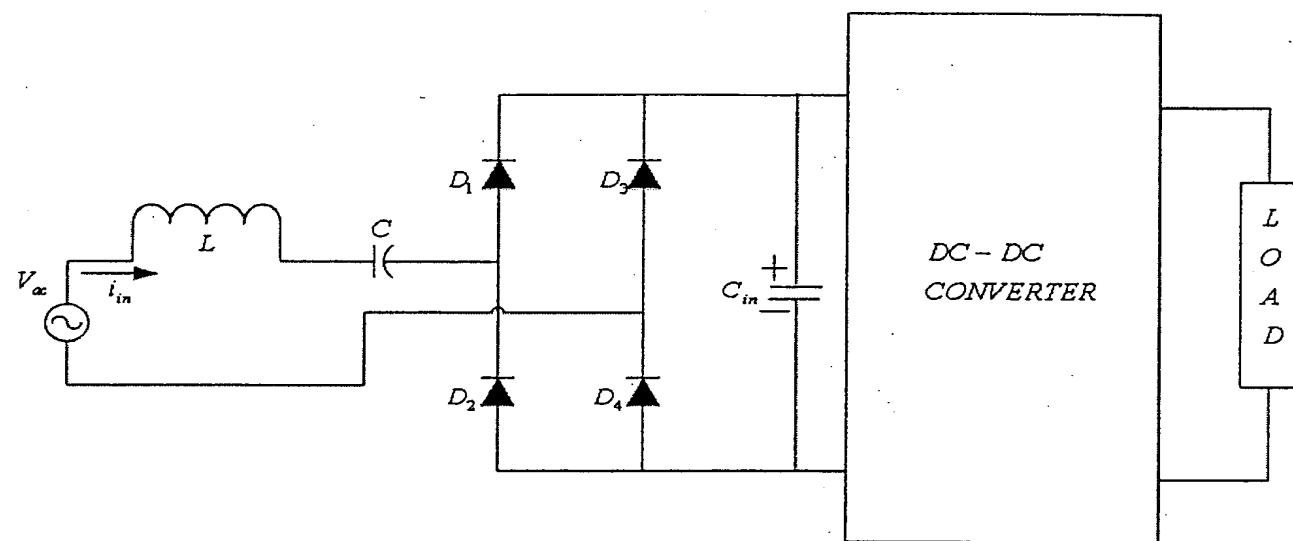


FIG. 2 (PRIOR ART)

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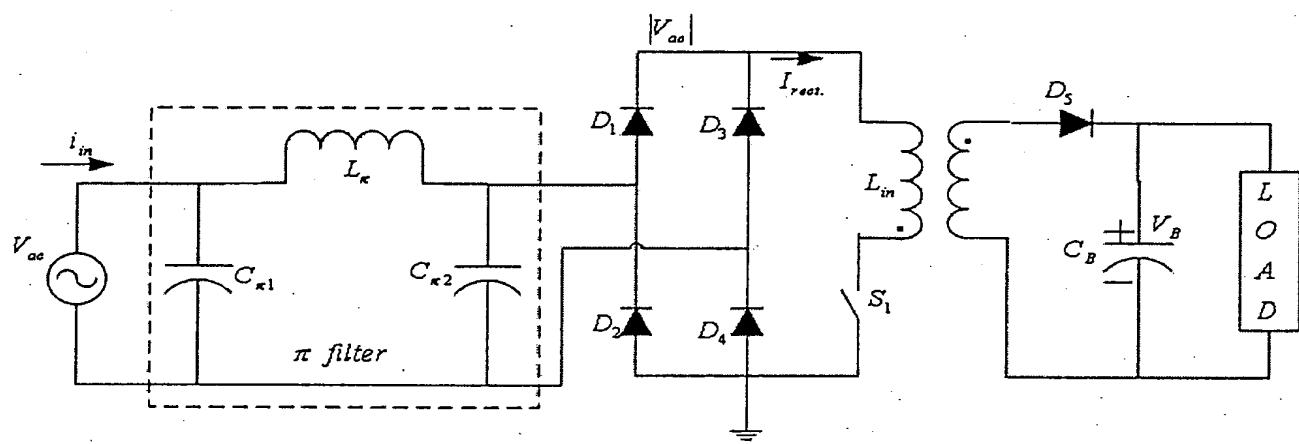


FIG. 3 (PRIOR ART)

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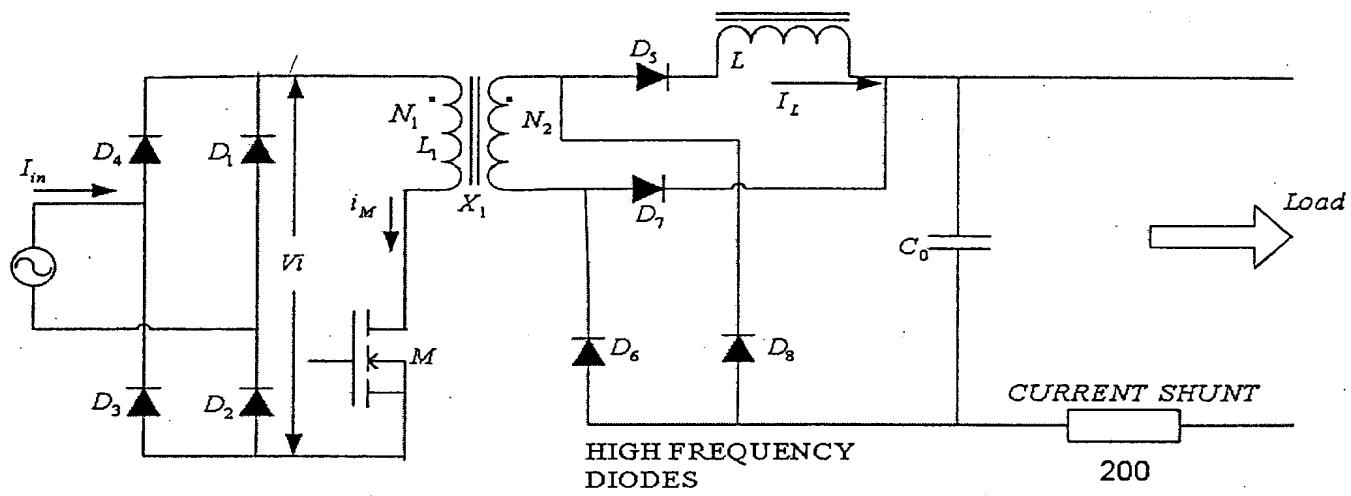


FIG. 4

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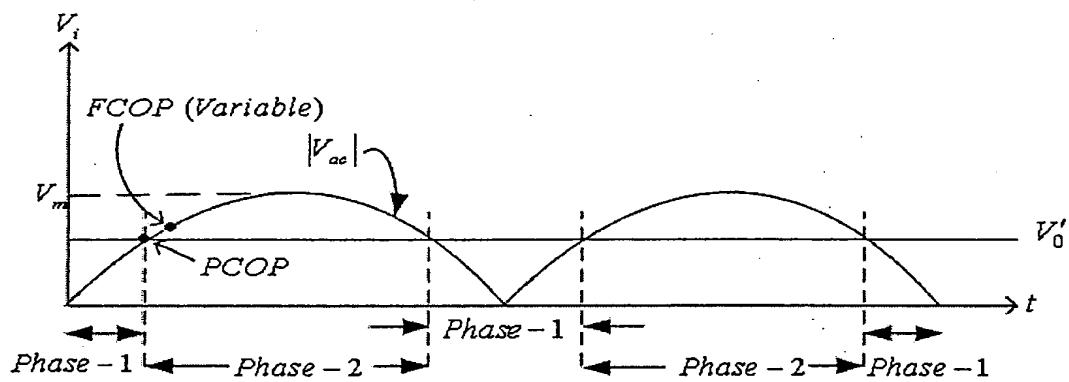


FIG. 5

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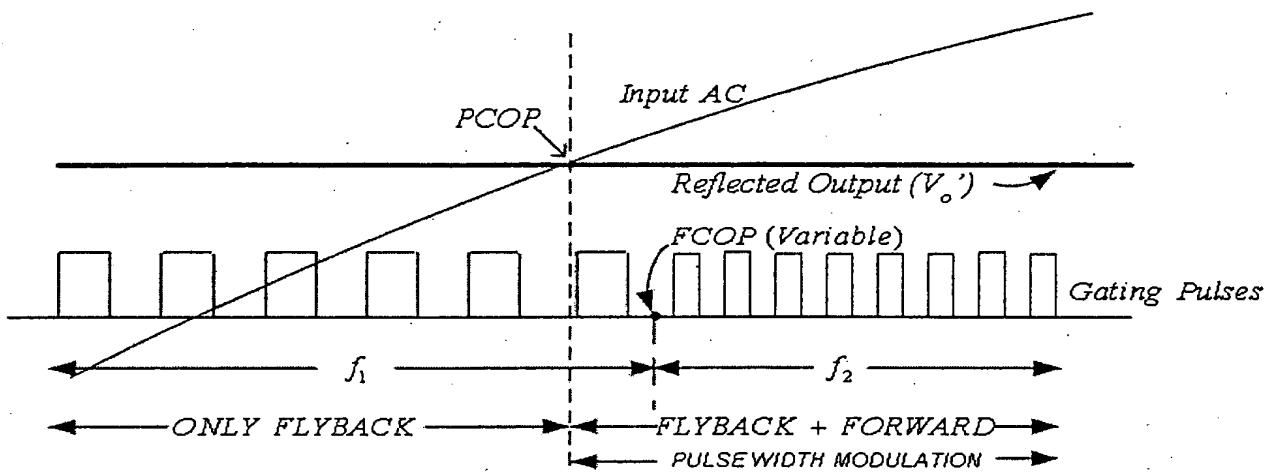


FIG. 6

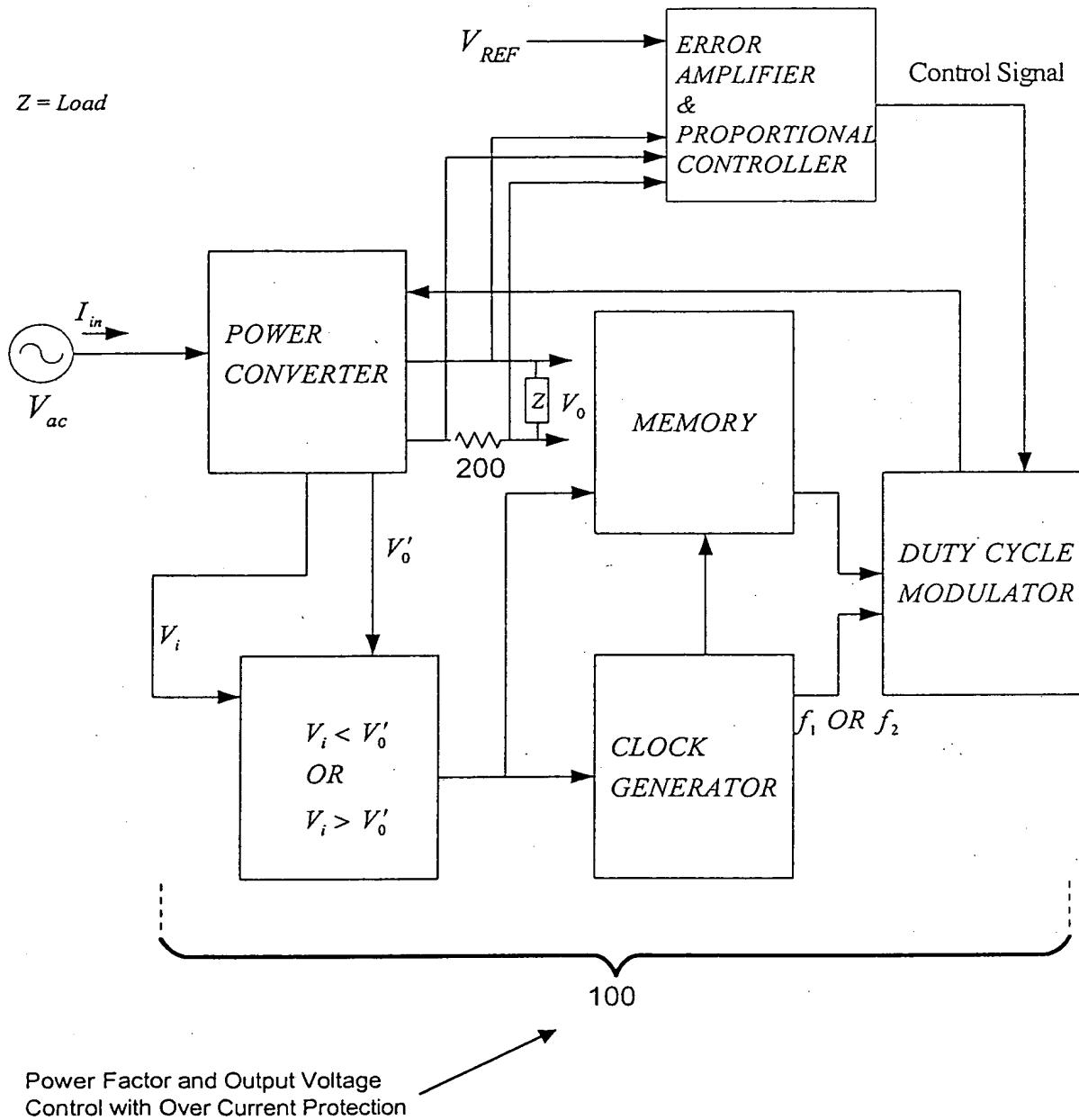


FIG. 7

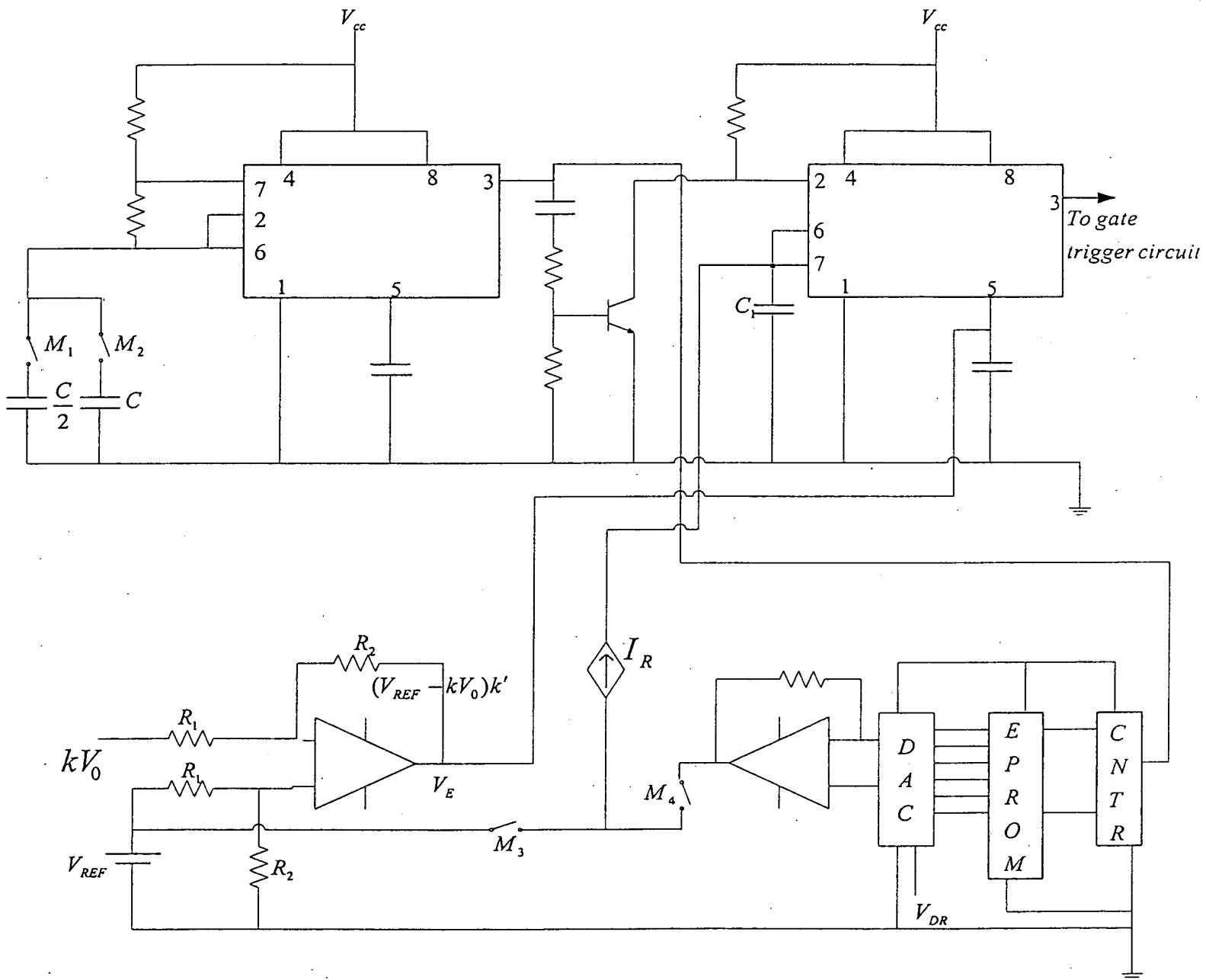


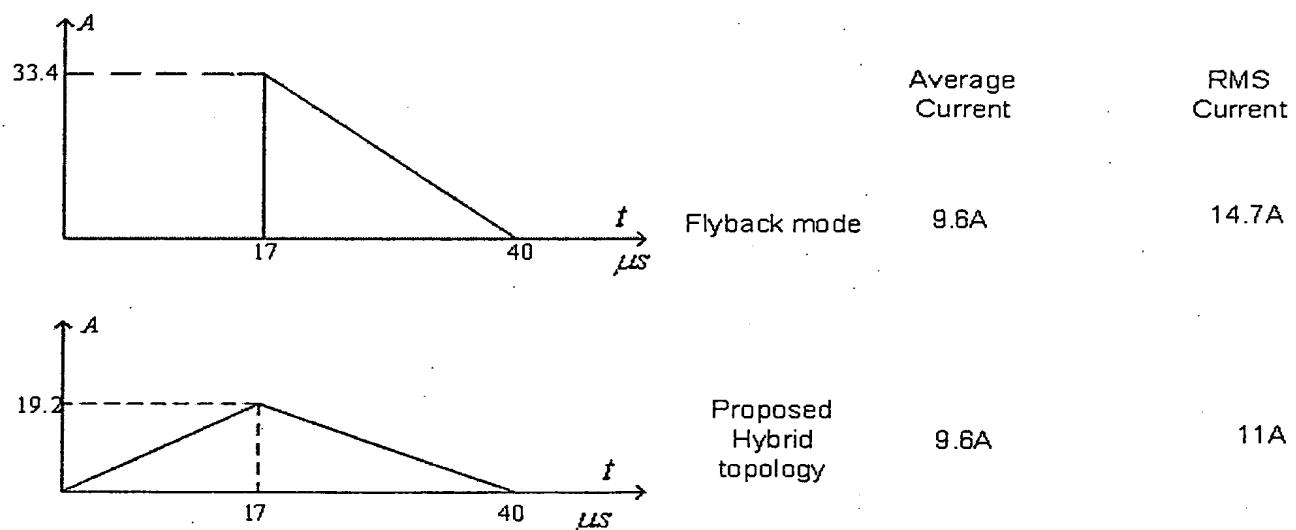
FIG. 8 Schematic of Power Factor and Output Voltage Control

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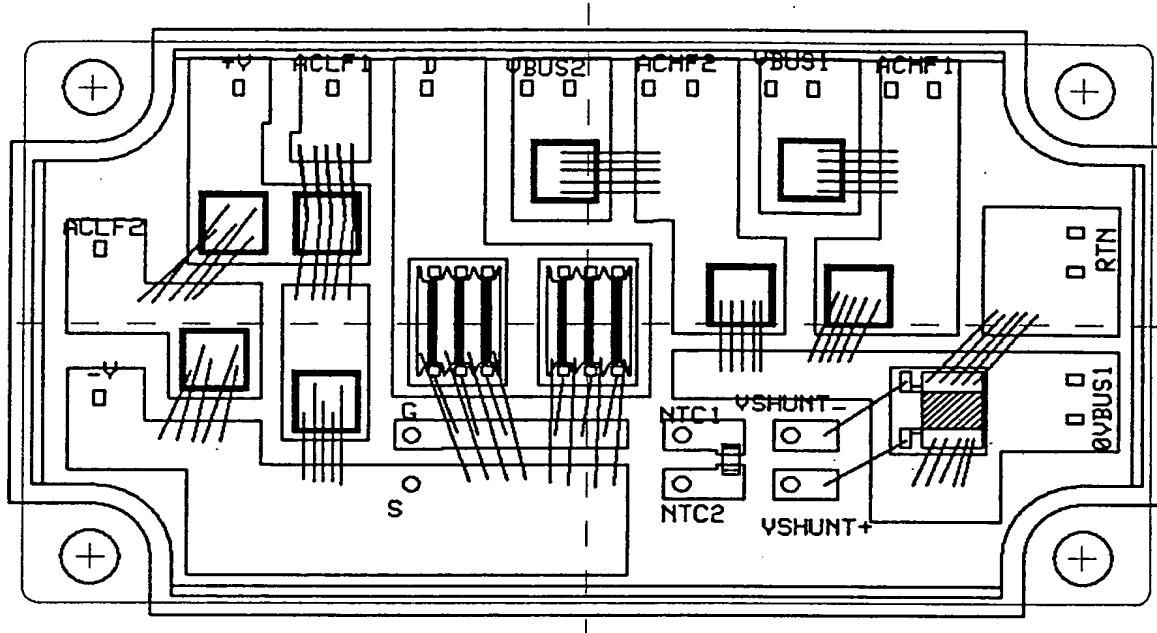
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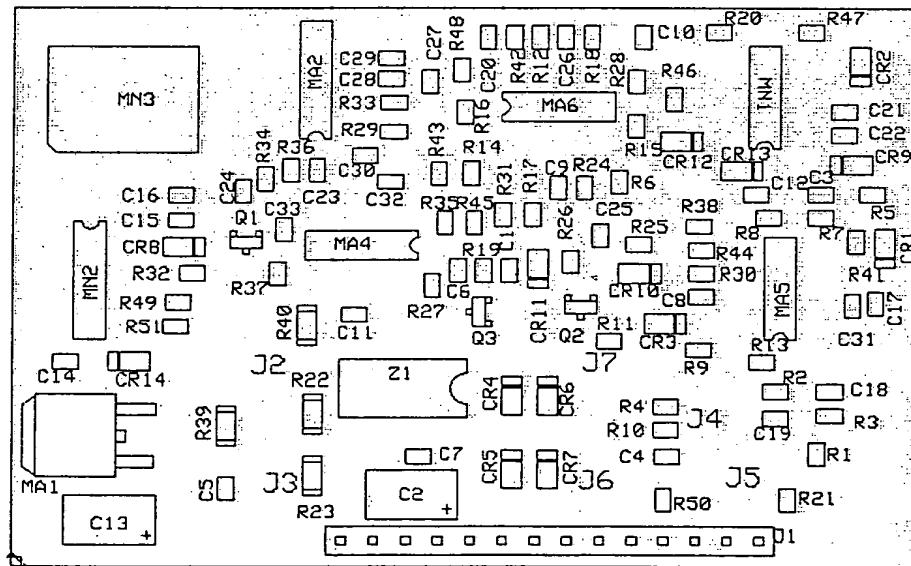
Secondary current waveforms

Hybrid technology helps significantly to reduce both peak and RMS currents

Fig. 9 The secondary current waveforms for a flyback converter and



(a) Smart converter module - Power stage



(b) Smart converter module – control stage

Fig. 10 Power Module Layout

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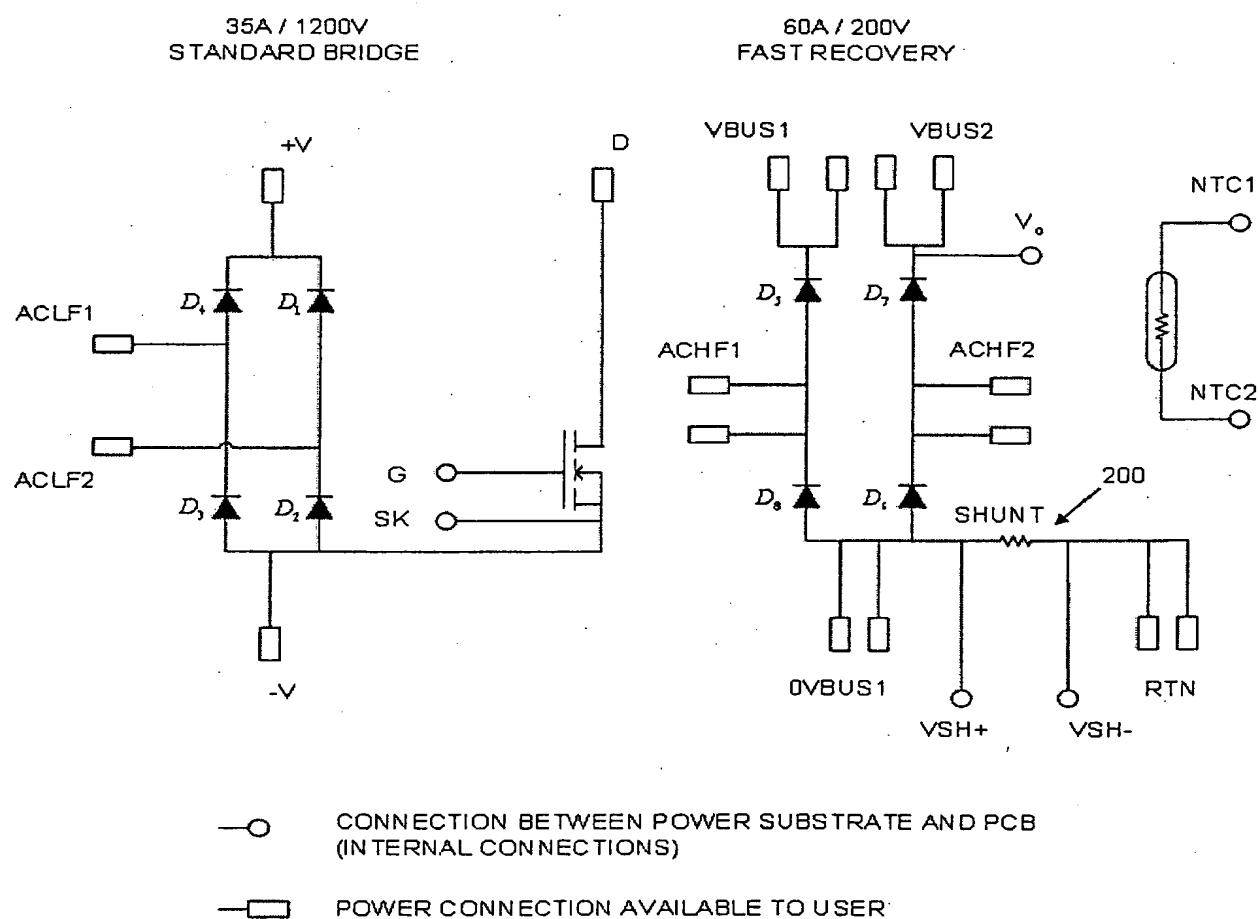


FIG. 11

- (1) Module base plate (IMS substrate)
- (2) Silicon chips and other power components, soldered to the substrate: upper connections to chips via ultrasonically bonded aluminium wires.
- (3) Moulded outer wall
- (4) Silicone gel conformal coating over substrate assembly
- (5) Resin top layer to fill the cavity
- (6) Internal PCB, with all necessary control and protection functions: hybrid SMD/chip construction.
- (7) 1 x 1.5 solderable power connectors
- (8) Small signal connector. These connectors are available to the user for control circuit inputs (e.g. power supply points, dc output voltage feedback signal etc.)

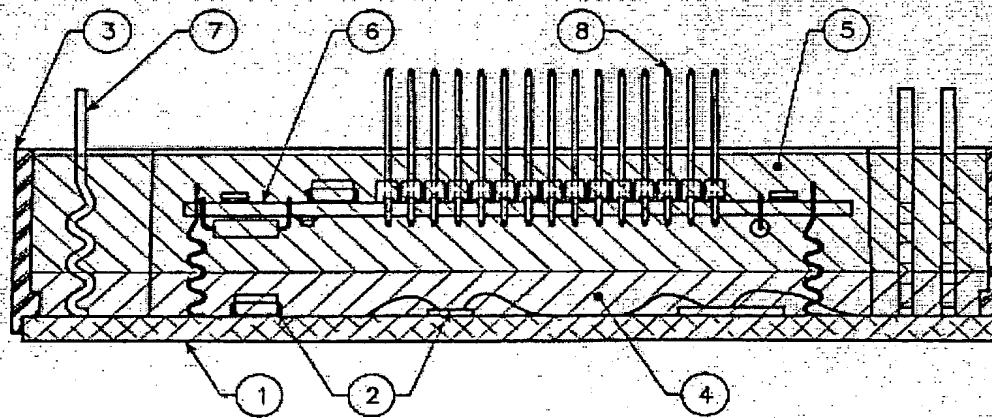


Fig. 12

Cross-section of the Module

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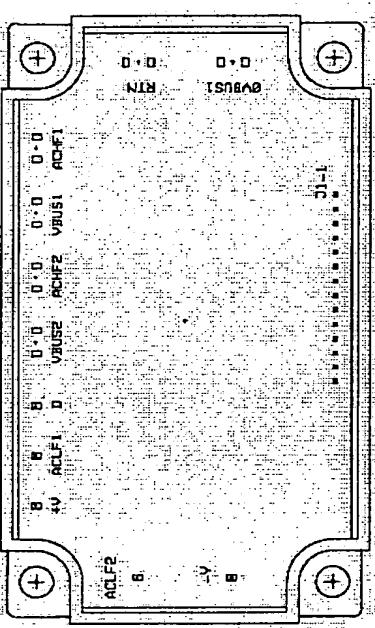


FIG. 13

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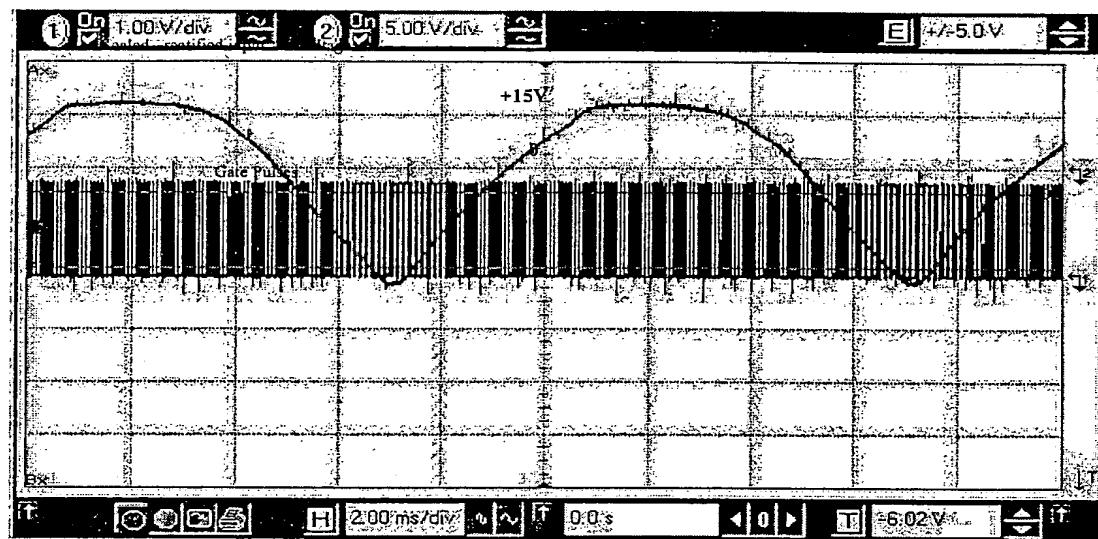


FIG. 14

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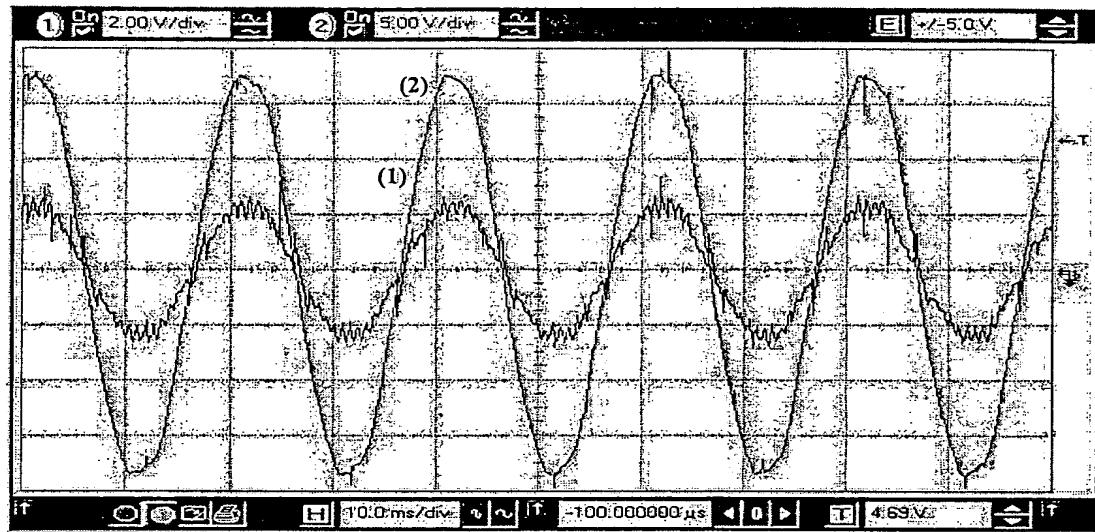


FIG. 15

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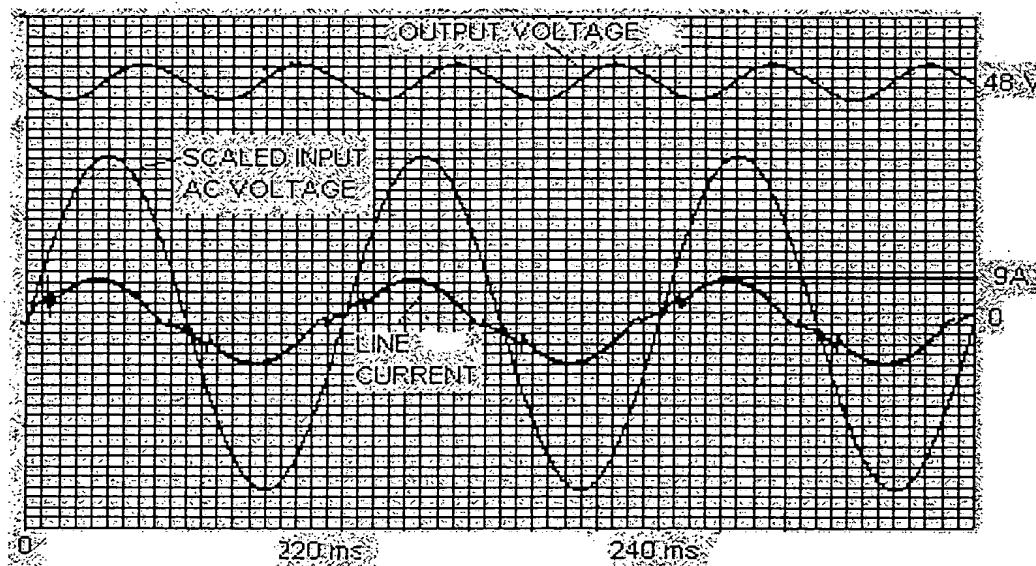


FIG. 16

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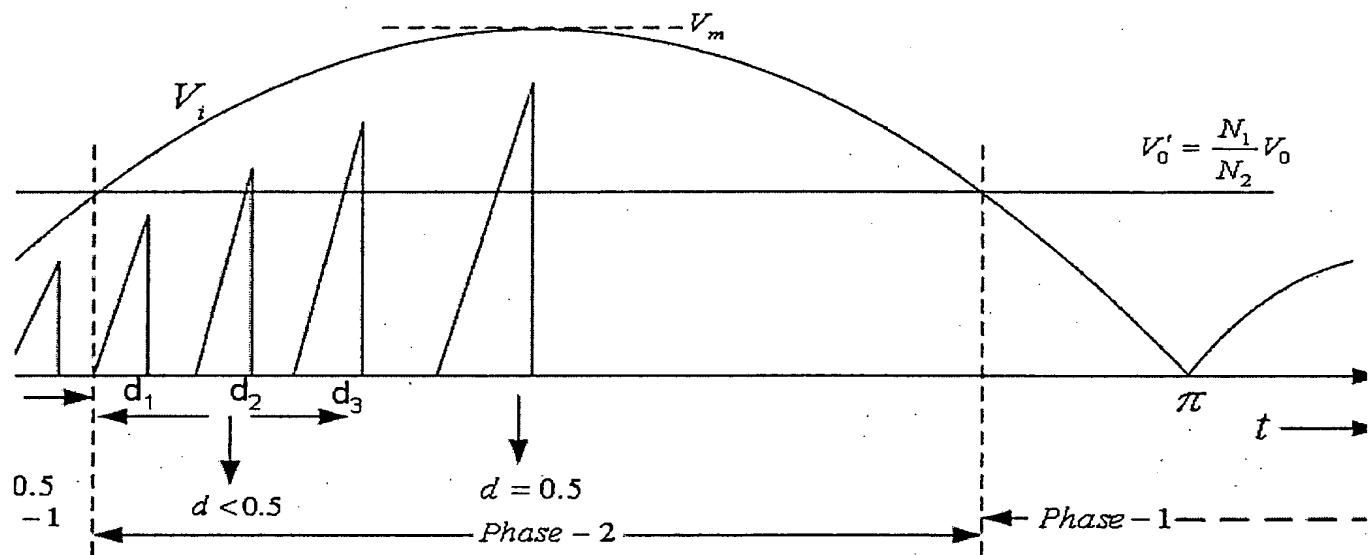
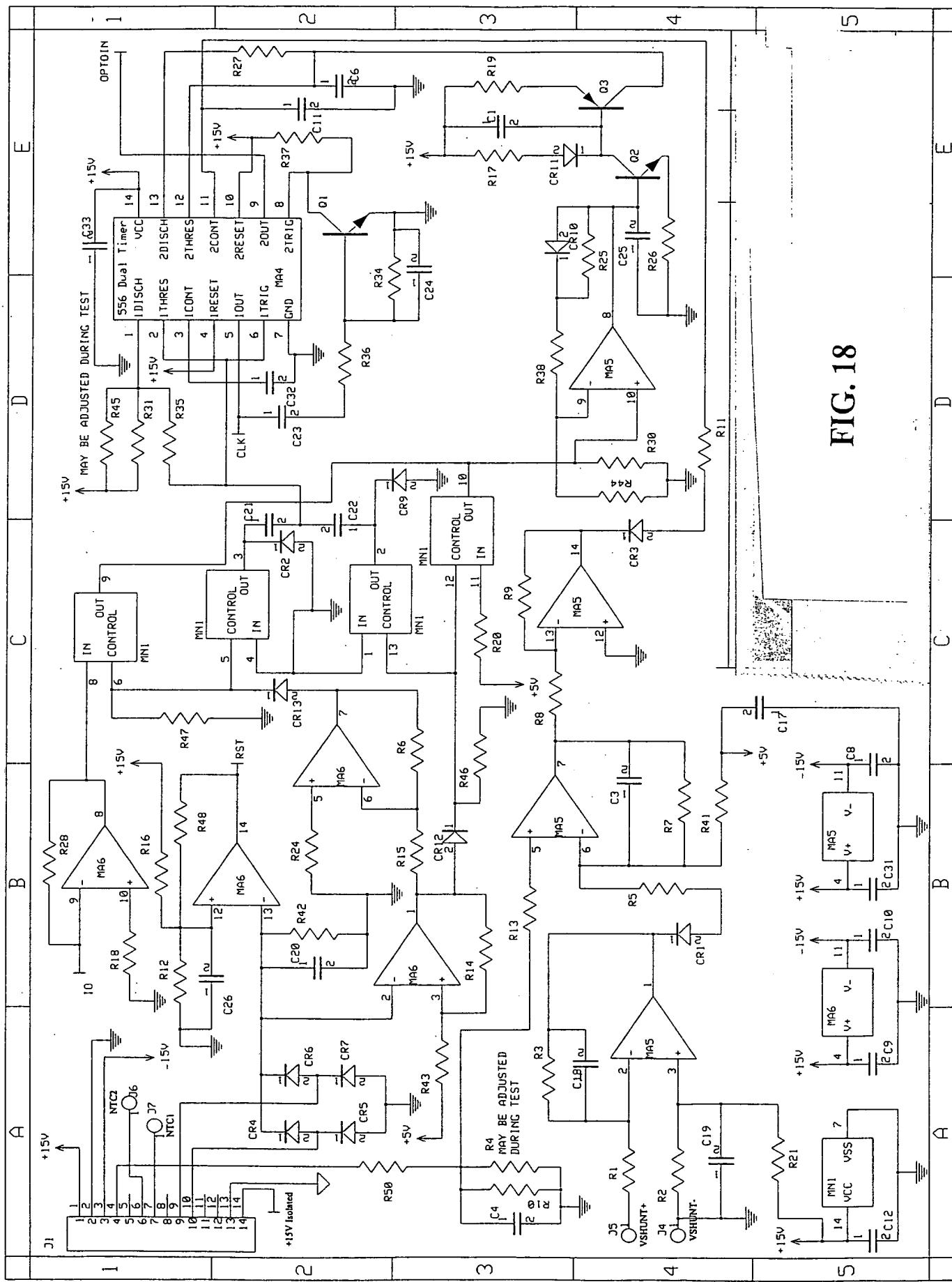
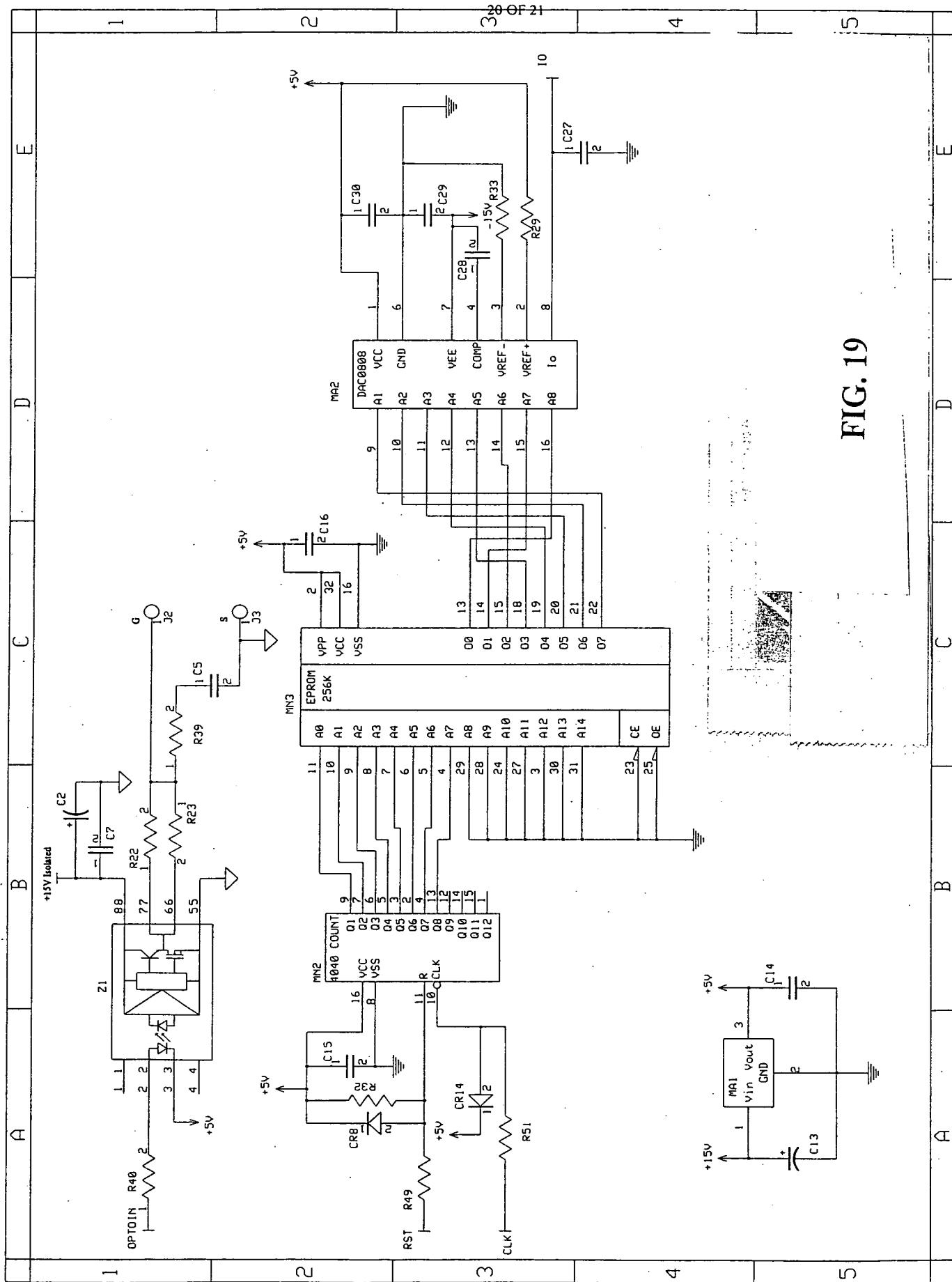


Fig. 17 Primary Side Current Waveforms
Corresponding to the Maximum Load Condition
 $d_1 < d_2 < d_3 < \dots$





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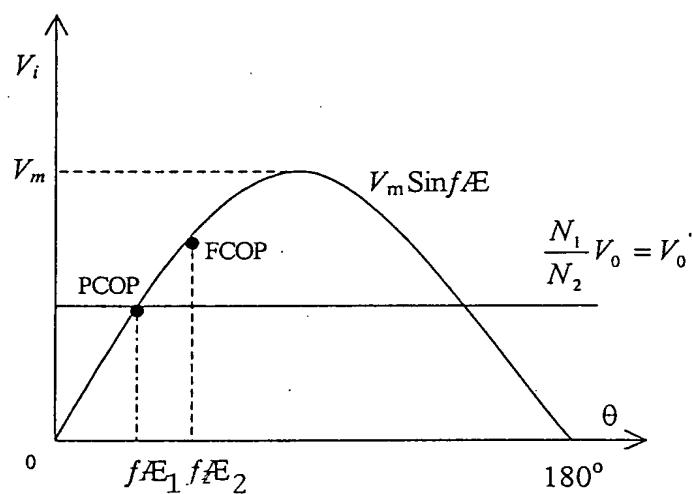


Fig. 20 Diagram showing relative positions of PCOP and FCOP